

Materials

Analysis

During reverse engineering and design, six basic material analysis techniques are used to determine material type and grade. In some cases, more advanced metallurgical studies are required to determine grain structure or the origin of the sample. In all cases, a combination of experience and cursory evidence indicate the optimal method.

Common Techniques for Analysis of Sample Materials

1. Observation and handling
2. Mass calculation – performed by comparison of sample weight to calculated weight.
3. X-Ray fluorescence (SEM) – involving beamstrike. This method is considered mostly qualitative.
4. Optical emission – involving arc discharge. More accurate than X-Ray fluorescence, optical emission provide a more quantitative analysis. Accuracy is generally considered to be within 0.01%.
5. ICP – involving a dissolved solid. This technique is used in cases where extreme accuracy is required.
6. SIMS – used for determination of wafer contaminants only.

Typical ICP analysis of Tantalum

CUSTOMER:		DATE: 07/24/98	
ELECTRO-GRAPH 2365 CAMINO VIDA ROBLE CARLSBAD, CA 92009		P.O. NO: 9504	
Attention: DONALD EVANGELISTO		PART NUMBER: N/S	
		HEAT NUMBER: N/S	
		LOT NUMBER: N/S	
		SPECIFICATION: N/S	
		MMA W.O. NO: ETP-07-17-97509	
CERTIFICATION OF TESTING			
TANTALUM			
Element		Result	Specification Range
			Low High
Cr	<	0.01	0.00 NO SPEC
Si	<	0.01	0.00 NO SPEC
Ni	<	0.01	0.00 NO SPEC
Mo	<	0.01	0.00 NO SPEC
Mn	<	0.01	0.00 NO SPEC
Ti	<	0.01	0.00 NO SPEC
M	<	0.01	0.00 NO SPEC
Fe	<	0.01	0.00 NO SPEC
Cu	<	0.01	0.00 NO SPEC
Al	<	0.01	0.00 NO SPEC
V	<	0.01	0.00 NO SPEC
Co	<	0.01	0.00 NO SPEC
Ta	=	BALANCE	BALANCE BALANCE
CHEMICAL ANALYSIS PERFORMED BY ICP AT METALS ENGINEERING & TESTING LABORATORIES, ARIZONA			